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New species of the genus *Phlugiolopsis* from its subgenus *Omkoiana* stat. nov. (Orthoptera: Tettigoniidae: Meconematinae)

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ABSTRACT

The genus *Phlugiolopsis* Zeuner, 1940 is considered: its brief comparison with some similar genera is given, and its subgeneric composition is discussed. This genus is tentatively subdivided into two subgenera: *Phlugiolopsis* s. str. with three possible species; the subgenus *Omkoiana* Sanger et Helfert, 2002, stat. nov. with all the other species of this genus including three “subgenera” with unclear status (*Longiloba* Bian et Shi, 2018; *Tribbranchis* Bian et Shi, 2018; *Uncinata* Bian et Shi, 2018). Two new species, *Ph. (O.) trilobulata* sp. nov. with three lobes on the male cercus and *Ph. (O.) bilobulata* sp. nov. with two such lobes, are described from Vietnam and Indonesia, respectively; these species additionally differ from each other in the male genital plate with specialized apical hooks (*Ph. trilobulata* sp. nov.) or with a slightly bilobate apex (*Ph. bilobulata* sp. nov.). From the other congeners, these species are distinguished by the same characters as well as some other features connected mainly with shape of the male cercal lobes and of the female genital plate.

Key words: Indo-Malayan Region, Meconematinae, Meconematini, new species, *Phlugiolopsis* (*Omkoiana* stat. nov.), Tettigoniidae

Новые виды кузнечиков рода *Phlugiolopsis* из подрода *Omkoiana* stat. nov. (Orthoptera: Tettigoniidae: Meconematinae)

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РЕЗЮМЕ

Рассмотрен род *Phlugiolopsis* Zeuner, 1940: даны краткое сравнение этого рода с некоторыми похожими родами и обсуждение его подродового состава. Этот род условно подразделен на два подрода: *Phlugiolopsis* s. str. с тремя возможными видами; подрод *Omkoiana* Sanger et Helfert, 2002, stat. nov., включающий все другие виды этого рода, в том числе три «подрода» с неясным статусом (*Longiloba* Bian et Shi, 2018; *Tribbranchis* Bian et Shi, 2018; *Uncinata* Bian et Shi, 2018). Из Вьетнама и Индонезии соответственно описаны два новых вида: *Ph. (O.) trilobulata* sp. nov. с тремя лопастями на церке самца и *Ph. (O.) bilobulata* sp. nov. с двумя такими лопастями; эти виды дополнительно отличаются друг от друга генитальной пластинкой самца, имеющей специализированные вершинные крючки (*Ph. trilobulata* sp. nov.) или только слегка раздвоенную вершину (*Ph. bilobulata* sp. nov.). От других видов рода эти виды отличаются теми же признаками, а также некоторыми другими особенностями, связанными с формой церкальных лопастей самца и генитальной пластинки самки.

Key words: Индомалайская область, Meconematinae, Meconematini, новые виды, *Phlugiolopsis* (*Omkoiana* stat. nov.), Tettigoniidae

INTRODUCTION

In the tribe Meconematini, there are numerous Indo-Malayan species having the body structure typical of this tribe but with their pronotum moderately long in females and often slightly more elongate (and slightly inflated in the dorsal half) in males as well as without distinct humeral notches in both sexes, with the tegmina significantly shortened, without hind wings, and with the last abdominal tergite almost unspecialized in both sexes (Figs 1–3, 5–7, 9, 15). For these species, a few similar genera were described: *Phlugiolopsis* Zeuner, 1940; *Acyrtaspis* Bey-Bienko, 1955; *Tettigoniopsis* Yamasaki, 1982; *Cosmetura* Yamasaki, 1983; *Acosmetura* Liu, 2000; *Omkoiana* Sanger et Helfert, 2002. Differences between these “genera” are not very clear; some of them may be synonyms or subgenera of the same genus.

In particular, *Phlugiolopsis* and *Acyrtaspis* were synonymized to each other (Liu 2000). *Cosmetura* and *Tettigoniopsis* differ from them mainly in the development of a large specialized epiproct in male; but in some species included in *Tettigoniopsis*, this epiproct is probably rather small (Kano and Kawakita 1987). *Acosmetura* possibly differs from the previous “taxa” in the male genitalia sclerotized (Bian et al. 2014); but for majority of species including in *Phlugiolopsis*, *Tettigoniopsis*, and *Cosmetura*, the male genital structure is not studied. *Omkoiana* sensu Helfert and Sanger (2002) is practically indistinguishable from the genus *Phlugiolopsis* sensu all the later authors (Wang et al. 2012; Bian et al. 2012a, 2012b, 2013; Bian and Shi 2018) but differs from some species of this genus and from the other aforementioned “taxa” by a strongly specialized distal half of the male genital plate; however, similar (but usually less strong) and probably homologous specializations are developed in some other species of *Phlugiolopsis* s. l. In the latest paper (Bian and Shi 2018), the latter closely related species were divided into three new subgenera (*Longiloba*, *Tribbranchis*, and *Uncinata*), but differences between these subgenera are insufficiently understandable.

These circumstances led me to use here the following tentative classification: the genus *Phlugiolopsis* contains at least two subgenera (*Phlugiolopsis* s. str. = *Acyrtaspis*; subgenus *Omkoiana* stat. nov. including three “subgenera” of Bian and Shi); *Tettigoniopsis*, *Cosmetura*, and *Acosmetura* are not included in *Phlugiolopsis* s. l. and are in need of restudy and thorough comparison with the latter genus and with each other.

MATERIAL AND METHODS

The material studied, including types of the both new species, is deposited at the Zoological Institute, Russian Academy of Sciences, Saint Petersburg. The specimens are dry and pinned. They were collected at night in the tropical forests on the leaves of small trees and bushes using a flashlight. The photographs of these specimens and its morphological structures were made with a Leica MZ 16 stereomicroscope.

SYSTEMATICS

Genus *Phlugiolopsis* Zeuner, 1940

Note. The two subgenera of this genus differ from each other in the following characters: *Phlugiolopsis* s. str. has the male cercus rather thin and arcuately elongate as well as with one medial projection located approximately in the middle cercal part, and its male genital plate is with a pair of styles located almost at the apex of this plate and near each other; the subgenus *Omkoiana* stat. nov. has the male cercus with a less thin and less arcuate proximal half as well as with two or three lamellar lobes on this half (one–two dorsomedial lobes and one ventromedial lobe), and its male genital plate is with the posteromedian lobe shortly or strongly protruding behind the styles, more or less wide (i.e., these styles are located not near each other), and often having a narrow posteromedian projection sometimes curved downwards and/or with a pair of hooks at its apex (Figs 9–13, 15–17).

Phlugiolopsis s. str. includes the following species: type species of this genus – *Ph. henryi* Zeuner, 1940 with unknown geographic origin (it was described from a green house in London; Zeuner 1940); type species of *Acyrtaspis* – *Xiphidiopsis grahami* Tinkham, 1944 (China); possibly *Ph. yaeyamensis* Yamasaki, 1986 (Japan) lacking any distinct projections on the male cercus but having the male genital plate more similar to that of the second subgenus.

The latter subgenus (*Omkoiana* stat. nov.) contains its type species – *O. aculeata* Sanger et Helfert, 2002 as well as all the other Chinese and Vietnamese species included in *Phlugiolopsis* s. l. in the Orthoptera Species File (Cigliano et al. 2020), except for two Chinese species known only after females and with unclear subgeneric position: *Ph. carinata* Wang, Li et Liu, 2012; *Ph. circolobosis* Bian, Shi et Chang, 2013. Here, two additional species of this subgenus are described.

***Phlugiolopsis (Omkoiana) trilobulata* sp. nov.**
(Figs 1–4, 9–14)

Etymology. This species name originates from the Latin word “lobulata” (with lobules) and the Latin prefix “tri-” (three), because this species has its male cercus with three rather small lobes.

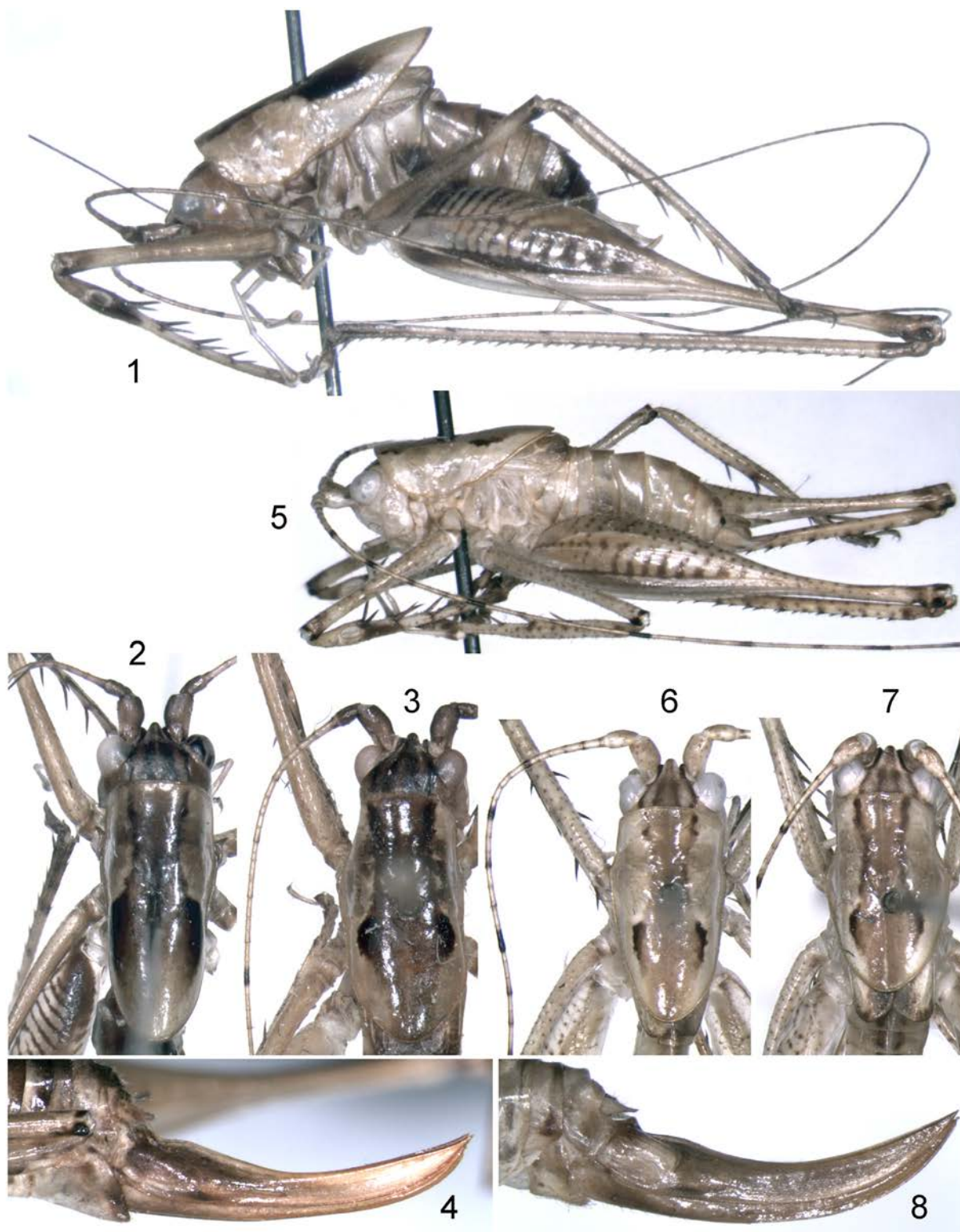
Type material. *Holotype* – male, VIETNAM: Tuyen Quang Prov., Na Hang Distr., Na Hang Protected Area near Na Hang Town, 600 m, 16–22 June 2019, N. Orlov, L. Iogansen. *Paratypes*: 1 male, same data as for holotype; 4 females, VIETNAM, Ha Tinh Prov., Huong Son Vill. on Rao An River, 18°21'N, 105°13'E, April 2000, N. Orlov.

Description. *Male* (holotype). Body coloration variegated (Figs 1, 2): head light brown with four dark brown longitudinal stripes on dorsum (medial stripes reaching rostral apex; lateral ones reaching dark medial edges of antennal cavities), yellowish mouthparts (except for darkened mandibular teeth), brown scape and pedicel, and small sparse dark and darkish spots on antennal flagellum; pronotum yellowish with a pair of brown to dark brown stripes along lateral edges of disc (in distal half of pronotum, these stripes darker and wider, i.e., including upper parts of lateral lobes) and with light brown space on disc between these stripes; tegmina yellowish with brown most part of each lateral field and stripe along each distal edge; legs and other thoracic parts yellowish with pleurites as well as fore and middle coxae partly light brown, femora having brown to dark brown distal areas (but hind femur additionally with characteristic reticular brown pattern on proximal half of outer surface), fore tibia having greyish brown proximal and apical areas as well as partly darkened tympanic membranes and almost dark brown spines and area near tympana, middle and hind tibiae similar in coloration but having slightly darker proximal parts and lacking dark areas near these parts (their spines barely lighter than in fore tibia), hind tibia additionally with sparse small darkish spots at bases of ventral spinules, and all tarsi greyish brown; abdomen light brown with yellowish cerci, dark brown epiproct and paraprocts as well as lower parts of all tergites and remaining parts of three last tergites, and darkened lateral areas on genital plate. Head with short conical upper rostral tubercle, without distinct lower rostral tubercle, with space between antennal cavities narrow (scape almost four times as wide as this space); pronotum reaching middle of

third abdominal tergite, with distal part gradually narrowing to rounded apex, and with lateral lobe having only slight trace of humeral notch (Figs 1, 2); tegmina more or less reaching pronotal apex, with distal part roundly truncate, stridulatory apparatus developed, and lateral fields low but having a few poorly distinct and irregular veinlets; legs moderately long and thin but with hind femur having thickened proximal half (i.e., well adapted for jumping), with fore tibia having rather large and oval tympana as well as one subapical outer ventral spine and four pairs of more distal ventral spines (subapical spine short, but more distal spines moderately long), with middle tibia having spines as in fore tibia but with a pair of short subapical ventral spines, with hind tibia having two rows of numerous short dorsal spines and much sparse and smaller ventral spinules (inner row with a few spinules in distal tibial part; outer row with several spinules in distal and middle parts of tibia). Last abdominal tergite with almost straight posterior edge having very small and angular posteromedian notch (Fig. 9); epiproct small, well separated from previous tergite, and more or less rhombic in shape (posterior view); paraprocts also small, simple, rounded posteromedially; cercus with very short and moderately thick basal part, two rather small (short) lamellar and rounded lobes located near this part (ventromedial lobe directed medially and slightly forwards; dorsomedial lobe directed medially and almost parallel to previous lobe), one lamellar and almost angular subdistal lobe (this lobe similar to previous ones in size and possibly originating from dorsomedial lobe, i.e., well separated from it by large notch), and rather long and thin as well as weakly curved (barely hooked) distal part (Figs 9–11); genital plate almost oval (barely elongate), with a pair of thin but moderately long styles, with rather wide lobe (between bases of styles) which distinctly but not strongly protruding behind these bases as well as having short and moderately narrow posteromedian projection, and with a pair of thin small hooks at apex of this projection (Figs 10–13); genitalia completely membranous.

Variations. Second male with most part of pronotal disc brown (i.e., approximately of same color as longitudinal stripes on disc of holotype), lateral parts of last tergite light brown, and ventromedial lobe of cercus partly darkish.

Female. General appearance as in males but with following differences in coloration: epicranium



Figs 1–8. *Phlugiolopsis* Zeuner: 1–4 – *Ph. trilobulata* sp. nov.; 5–8 – *Ph. bilobulata* sp. nov. General view of male from side (1, 5); anterior half of body in male (2, 6) and in female (3, 7) from above; ovipositor from side (4, 8).

under eyes yellowish; coloration of pronotum as in male paratype but with slightly darker (almost dark brown) anterior half of darkened area on disc and distolateral spots on disc including parts of lateral lobes (these spots shorter than distal widened portions of dark stripes in holotype); tegmina with yellowish lateral fields; pattern on legs less developed (lighter); abdomen with almost yellowish sternites, brown median part of all tergites, yellowish to light brown areas between darkened median and lateral (lower) parts of tergites (except for yellowish last tergite having only median part slightly darkened), light brown epiproct and paraprocts, yellowish cerci and genital plate except for slightly or barely darkened posterior part of this plate, and light brown ovipositor having brown areas in proximal parts of upper valves (Figs 3, 4). Pronotum barely shorter than in male (Fig. 3); tegmina with a few almost straight longitudinal veins in dorsal field; cerci, epiproct, and paraprocts very small and simple in shape (cerci elongate but rather short and almost conical; others rounded); genital plate very large, slightly transverse, with apical part roundly angular, posterolateral parts widely rounded, and basal part having moderately deep transverse concavity and a pair of small lateral folds near posteroventral corners of last tergite (Fig. 14); ovipositor as in Fig. 4.

Length (mm). Body: male 8.0–8.5, female 7.0–10.0; pronotum: male 5.0–5.2, female 4.8–5.1; tegminal parts visible from side: male 1.5–2.0, female 1.8–2.2; hind femora: male 11.0–11.5, female 10.5–11.0; ovipositor 4.7–5.0.

Comparison. This species is similar to *Ph. brevis* Hsia et Liu, 1993, *Ph. tuberculata* Hsia et Liu, 1993, *Ph. yunnanensis* Shi et Ou, 2005, *Ph. digitusis* Bian, Shi et Chang, 2012, *Ph. huangi* Bian, Shi et Chang, 2012, *Ph. damingshanis* Bian, Shi et Chang, 2012, *Ph. pectinis* Bian, Shi et Chang, 2012, *Ph. pentagonis* Bian, Shi et Chang, 2013, and *Ph. angustimarginis* Bian et Shi, 2018 in the presence of three more or less distinct lamellar lobules on the male cercus (except for thin and curved distal part); but it clearly differs from them in the male genital plate having a small posteromedian projection with a pair of small and thin apical hooks. From all the other species of *Omkoiana* stat. nov., the new species is distinguished by the male cercal lobes more numerous (three but not two), and the aforementioned characters of male genital plate [this plate in these species has the apical projection wider and/or longer, with distinctly

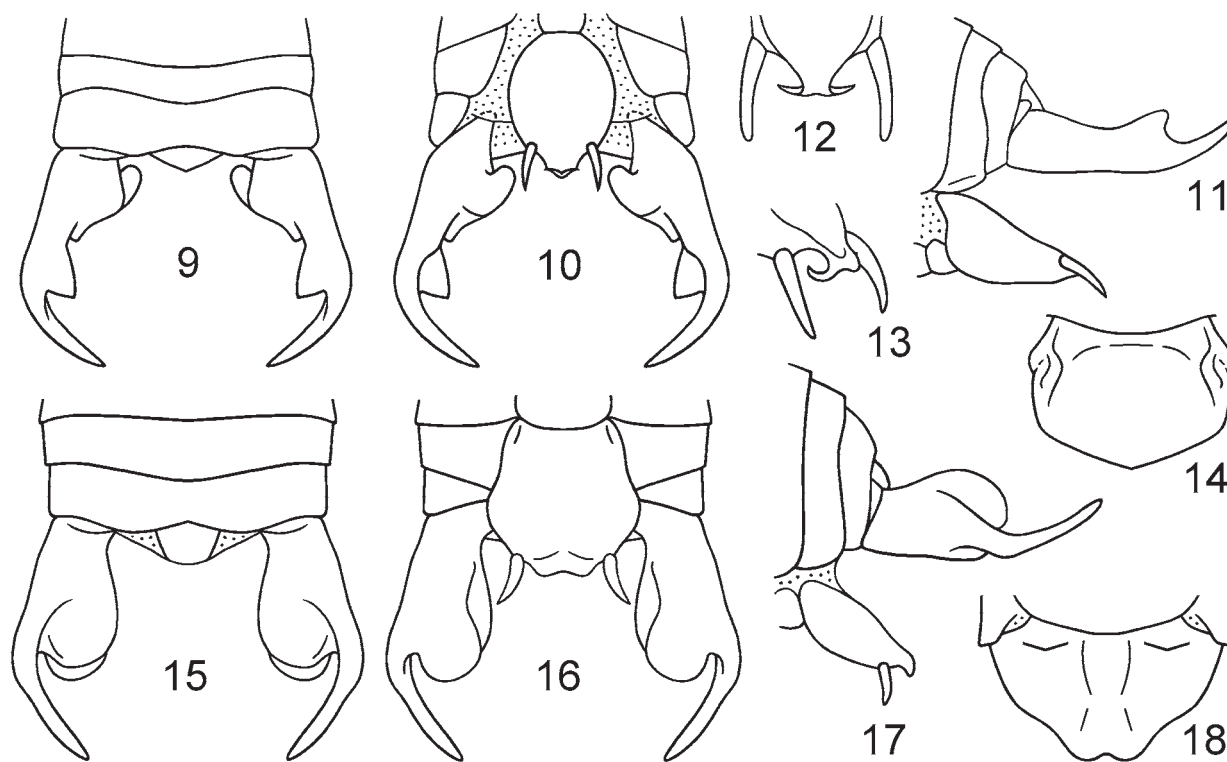
wider (lobule-like) hooks at its apex or with a widely truncate distal part]. From *Ph. circolobosis* Bian, Shi et Chang, 2013 and *Ph. carinata* Wang, Li et Liu, 2012 known after females only, the species discussed differs in an almost angular (not slightly bilobate) posteromedian projection of the female genital plate.

***Phlugiolopsis (Omkoiana) bilobulata* sp. nov.**
(Figs 5–8, 15–18)

Etymology. This species name originates from the Latin word “lobulata” (with lobules) and the Latin prefix “bi-” (two), because this species has its male cercus with two rather small lobes.

Type material. *Holotype* – male, INDONESIA: South Sumatra, Bengkulu Prov., environs of Curup Town (not far from Bengkulu City), 03°28–29'S, 102°31–38'E, 1000–1500 m, 24 April – 2 May 2009, A. Gorochov. *Paratypes*: 7 females, same data as for holotype.

Description. *Male.* Coloration and structure of body similar to those of *Ph. (O.) trilobulata* sp. nov. but with following differences (Figs 5, 6): body yellowish with four brown stripes on dorsum of head (almost as in above-mentioned species), more numerous small brown to light brown spots on antennal flagellum, very light brown marks in apical part of each maxillary palpus, light brown median band on pronotum, four brown stripes along lateral edges of this band, darkish distal parts of tegmina and numerous dots on femora and tibiae, light brown to brown spots in apical parts of femora and in proximal half of fore tibia, light brown small spots in subapical parts of middle and hind tibiae as well as at bases of spines and at apices of all tibiae, darkish pattern on outer side of hind femur (Fig. 5), partly darkish all tarsi and median part of last tergite, brown epiproct (except for yellowish proximedian area) and dark brown paraprocts; pronotum slightly shorter than in *Ph. (O.) trilobulata* sp. nov. (Figs 5, 6); tegmina distinctly but weakly protruding behind pronotal apex; cercus with longer distal (thin) part, with two rounded and rather large medial lobes (ventral lobe slightly longer but narrower than dorsal one) fused with each other near base of distal cercal part as well as directed dorso-medially and ventro-medially (Figs 15–17); epiproct almost obtusely triangular (Fig. 15); genital plate roundly widened after middle, narrowing to short and weakly bilobate but moderately wide posteromedian lobe having its distal part slightly curved downwards,



Figs 9–18. *Phlugiolopsis* Zeuner: 9–14 – *Ph. trilobulata* sp. nov.; 15–18 – *Ph. bilobulata* sp. nov. Male abdominal apex without genital plate from above (9, 15) as well as with this plate from below (10, 16) and from side (11, 17); distal part of male genital plate, posterodorsal (12) and posterodorsolateral (13) views; female genital plate from below (14, 18).

and with styles similar to those of previous species (considered here) and having rather wide distance between them (Figs 16, 17).

Female. General appearance as in male, but pronotum slightly shorter, tegminal portions protruding behind pronotum slightly longer as well as with darkened medial parts and almost indistinct irregular venation in dorsal fields, abdominal tergites often with darkish median areas (Fig. 7), and cerci as in female of *Ph. (O.) trilobulata* sp. nov.; genital plate with a pair of slight concavities along its posterolateral edges, with small rounded posteromedian notch and rounded lobules around it, and without distinct specializations in basal part of this plate (Fig. 18); ovipositor as in Fig. 8.

Length (mm). Body: male 7.5, female 7.0–9.5; pronotum: male 3.5, female 3.2–3.4; tegminal parts visible from side: male 1.4, female 1.5–1.8; hind femora: male 8.8, female 8.3–9.2; ovipositor 4.9–5.1.

Comparison. This species is more or less similar to *Ph. punctata* Wang, Liu et Li, 2012, *Ph. trullis* Bian, Shi et Chang, 2012, and *Ph. emarginata* Bian,

Shi et Chang, 2013 in the presence of a short and slightly (but distinctly) bilobate posteromedian lobe of the male genital plate as well as in the presence of two large medial lobes on the male cercus, but the new species is distinguished from these congeners by the both male medial cercal lobes clearly more longer, widely rounded and lacking any distal lobules. From all the other species of this subgenus, the new species differs in the apex of the male genital plate bilobate but less specialized or less long, the male cercus with only two medial lobes, and these lobes very different in size and/or in shape. From *Ph. circolobosis* and *Ph. carinata* known after females only, the species discussed differs in a narrower distal part of the female genital plate.

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